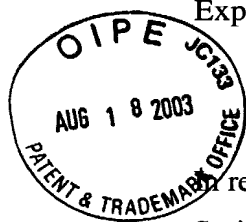


Docket No.: 7243

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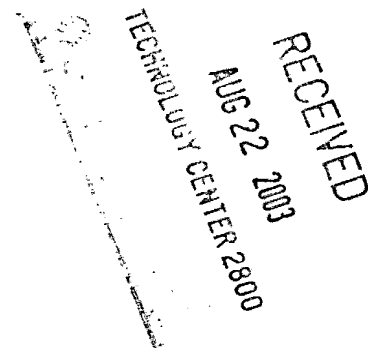
PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re Application of: Takeshi Nogami : Confirmation No.: 7243
Serial No.: 09/579,340 : Art Unit: 2814
Filed: 5/25/2000 : Examiner: Vikki H. Trinh
For: INTEGRATED CIRCUIT :
CHIP WITH HIGH-
ASPECT RATIO VIAS

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450



REQUEST FOR REINSTATEMENT OF THE APPEAL

UNDER 37 CFR § 1.193(B)(2)(ii)

AND

SUPPLEMENTAL APPEAL BRIEF

Sir:

In response to the Office Action mailed June 18, 2003, Applicant respectfully requests Reinstatement of the Appeal Under 37 CFR § 1.193(b)(2)(ii). The following Supplemental Appeal Brief is submitted in response to the June 18, 2003, Office Action and Applicant's March 3, 2003, Appeal Brief in the above identified Application.

(1) *Real party in interest:*

The real party in interest is Advanced Micro Devices, Inc. of One AMD Place, P.O. Box 3453, Sunnyvale, CA 94088-3453.

(2) ***Related appeals and interferences:***

There are no known related appeal or interference cases.

(3) ***Status of claims:***

Claims 1-20, the only claims pending, stand under rejection in a reopened prosecution in a non-final Office action, from which rejection this Appeal is taken.

(4) ***Status of amendments:***

No amendments have been filed subsequent to the final rejection of October 2, 2002.

(5) ***Summary of invention:***

The present invention is an integrated circuit chip including a semiconductor substrate [100] with a semiconductor device [112]. A dielectric layer [110,122] is formed having a channel opening [103] and a via [105]. The via [105] having a via entrant angle [70] formed with the channel opening [103] of greater than about 69 degrees whereby said channel opening [103] forms a collimator for the via [103]. A seed layer [146] lines the channel opening [103] and the via [105]. A conductive layer [107] is damascened into the seed layer [146] and the dielectric layer [110] whereby the conductive layer [107] in said channel opening [103] is operatively connected by the conductive layer [107] in the via [105] to the semiconductor device [112] without voids.

(6) ***Issues:***

Issue 1:

Whether a suggestion, teaching, or motivation to combine prior art references is an essential component of an obviousness holding.

Issue 2:

Where there is no motivation articulated for combining the references, it is not obvious to those skilled in the art to combine the references, and the applicant requests an

Examiner Affidavit pursuant to 37 CFR §1.104(d)(2) (2002) disclosing the Examiner's personal knowledge being used to combine the references, whether the Examiner may respond by repeating the applicant's remarks are not persuasive, repeating the Examiner has established a prima facie case by paraphrasing portions of the claim, and concluding the applicant's argument is moot.

Issue 3:

Whether claims 1-20 are rejected under 35 USC §103(a) as being obvious over admitted prior art (FIGs. 1A-1C and Specification pages 1-7, hereinafter "APA") in view of Wang et al. (USPN 5, 629, 237, hereinafter "Wang").

(7) *Grouping of claims:*

With respect to the ground of rejection under 35 USC §103(a) claims 1, 2, 10-12, and 20 stand or fall separately, claims 3-9 stand or fall together, and claims 13-19 stand or fall together.

(8) *Arguments:*

Issue 1:

Whether a suggestion, teaching, or motivation to combine prior art references is an essential component of an obviousness holding.

Previously, in the Examiner's Final Rejection of 10/02/2002, Page 3, in the paragraph starting at line 13, the Examiner stated the standard of obviousness she is applying to the present invention:

"The courts have concluded that there is no requirement that a motivation to make the modification be expressly articulated...." [underlining for clarity]

In the new Office Action of 6/18/03, in the paragraph spanning pages 5-6, the Examiner states the standard of obviousness she is now applying to the present invention:

“With respect to applicant's remarks on page 3, last paragraph, applicant began by characterizing to the examiner cited case laws as “obsolete standard” for obviousness. Applicant is reminded that case law is authoritative unless the court overrules it. The court in In re Sang-Su Lee, reversed the board for failing to draw conclusions based upon reasoning supported by evidence of record. The Lee court citing In Re Fritch stated that *an examiner may satisfy the burden of showing obviousness by showing an objective teaching or that knowledge generally available would lead one to combine the teachings.*” [italics for clarity]

In *In re Sang-Su Lee*, the application was directed to a method of automatically displaying functions of a video display device and demonstrating how to select and adjust the function in order to facilitate response by the user. The examiner rejection was based on obviousness based on two references. One reference was for a television menu for adjusting the picture and audio functions without a demonstration of how to adjust the functions. The other reference was for a videogame having a demonstration mode without showing adjusting the picture or audio functions. The Examiner's rationale for the combination was that it:

“would have been obvious to one of ordinary skill in the art since the demonstration mode is just a programmable feature which can be used in many different device(s) for providing automatic introduction by adding the proper programming software,” and that “another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial.”

On appeal to the Board, the Board upheld the rejection by stating:

“The conclusion of obviousness may be made from common knowledge and common sense of a person of ordinary skill in the art without any specific hint or suggestion in a particular reference.”

The CAFC vacated and remanded, stating in particular that the Board's rejection of the need “for any specific hint or suggestion in a particular reference” to support the combination of the references was an “[o]mission of a relevant factor required by precedent [which] is both legal error and arbitrary agency action.” [insertion and underlining for clarity]

The Examiner misunderstands and mistates *In re Fritch*, 972 F.2d 1260, 23 USPQ 2d 1780, 1783 Fed. Cir. 1992, as cited in *In re Sang-su Lee*, supra. *In re Fritch* is a requirement supplementary to *In re Sang-su Lee*, and the CAFC actually stated:

“In re Fritch, 972 F.2d 1260, 23 USPQ 2d 1780, 1783 (Fed. Cir. 1992)(the examiner can satisfy the burden of showing obviousness of the combination “only by showing some objective teaching in the prior art or

that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references”).”
[italics for clarity]

The above is not an optional statement about how an examiner “may” satisfy the burden of proof but is a minimum requirement; i.e., “only” by showing. *In re Sang-su Lee* further sets the standard that the conclusion of obviousness may not be made from common knowledge and common sense of a person of ordinary skill in the art without any specific hint or suggestion in a particular reference.

The Examiner has not met this standard as explained further below for Issue #3 and there is no motivation for the combination.

Where there is no motivation expressly articulated in either reference, there must either be no motivation or the motivation must be based on the Examiner’s personal knowledge so an Examiner Affidavit pursuant to 37 CFR §1.104(d)(2) (2002) disclosing the Examiner’s personal knowledge was appropriately requested. No Examiner Affidavit has been provided.

Issue 2:

Where there continues to be no motivation articulated in the references for combining the references that is obvious to those skilled in the art and the applicant has requested an Examiner Affidavit pursuant to 37 CFR §1.104(d)(2) (2002) disclosing the Examiner’s personal knowledge being used to combine the references, the issue is not mooted until it can be established that the Examiner may not respond by stating conclusions as fact as in the Advisory Action of 01/02/2003, item 5:

“[A]pplicant’s argument is not persuasive. Applicant argues that the examiner uses obsolete law, in particular the cited cases law, *Graham v. John Deere Co* (1969), *In re McLaughlin* (1971), and *In re Bozek* (1969). On the contrary, the cited cases are still applicable and are used to supplement applicant’s understanding of the obviousness rejection under 35 USC 103(a).”

Unobviousness under Deere was specifically traversed in Appellant’s Amendment After Final of March 11, 2002.

And the more recent test for combining references was explained for Issue 1 above which is contrary to *In re McLaughlin* and *In re Bozek*.

The Examiner continued in the Advisory Action:

“The examiner has established the prima facie case of obviousness in the rejection. In particular, as stated in the final rejection, an artisan having ordinary skilled (sic) in the art at the time the invention was made would have been (sic) readily applied the entrant angle of APA with the overlapping range of the entrant angle of more than 69 degrees, as taught by Wang, so as to provide law resistance contacts. (see column 3, line 1.) Therefore, applicant’s argument is moot.”

It is respectfully submitted that the Examiner is not permitted to establish a prima facie case merely by stating:

“The admitted prior art and Wang et al. ‘237 are in the same field of endeavors.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to...”

The above is the only basis of obviousness set forth in both the Office Action of 09/12/01 and the Final Rejection 01/11/02. This was also a basis of rejection in *In re Sang-Su Lee*, supra., which was held to be inadequate as a basis of rejection.

It is respectfully submitted that the Examiner has failed to bear the burden of establishing a prima facie case so this Issue should be resolved with a holding that a prima facie case of obviousness has not been established and claims 1-20 are unobvious under 35 USC §103.

Issue 3:

Claims 1-20 are rejected under 35 USC §103(a) as being obvious over admitted prior art (FIGs. 1A-1C and Specification pages 1-7, hereinafter “APA”) in view of Wang et al. (USPN 5, 629, 237, hereinafter “Wang”).

Appellant respectfully traversed the rejections since the Appellant’s claimed combination, as exemplified in claim 1, includes the limitation not disclosed in APA or Wang of:

“...a dielectric layer formed over said semiconductor substrate and said semiconductor device, said dielectric layer having a channel opening and a via provided therein; said via having a via entrant angle formed with said channel opening of greater than about 69 degrees...” [underlining for clarity]

Applicant has traversed the rejections of claims 1-20 in the Appeal Brief and those arguments are incorporated herein by reference thereto.

With regard to the specific Examiner comment regarding Issue #3:

“Issue 3 : MPEP 2131.03 states that if a claimed range overlaps a prior art range, the claim is anticipated. Since Wang discloses 0-90 degrees, applicants' range of 69-90 is overlapped and therefore anticipated.”

It is respectfully submitted that MPEP 2131.03 more fully states:

“If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with “sufficient specificity” to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious.”

Wang teaches a broader range of less than 90 degrees while the invention claims greater than about 69 degrees to achieve the unexpected “channel collimator effect” as explained in the Specification page 7, line 21, through page 8, line 8:

“In the present invention, the second channel opening 103 is configured so that its width at the rims 134 form the via entrant angle 69 with the rim 132 of the via opening 105. This causes the rims 134 to act as a collimator for subsequent plasma or ion deposition processes where the deposition of the second adhesion/barrier layer 138 requires this “channel collimator effect”.

For deposition of the second seed layer 146, the metal flux of seed material, such as rays 142 and 144, are able to enter the via opening 105 where the channel collimator effect is caused by the second adhesion/barrier layer 138 over the rims 134. The metal flux with angles less than 70 degrees, such as shown by the ray 140 with its dotted line extension, will not be able to impact on the adhesion/barrier material on the rim 132 and constrict the top portion of the via opening 105. On the other hand, those rays, such as 142 and 144 which are close to being parallel to the axis of the via 105, will be collimated and will be able to enter and provide uniform seed layer coverage of the via 105 down to the bottom.

It has been determined that in order to achieve the channel collimator effect, it is necessary that the via entrant angle 69 from the rims 132 to the rim 134 as shown in FIG. 2, must be approximately 69 degrees or greater so as to provide the via entrant angle 70 as shown in FIG. 3 of at least 70 degrees over the adhesion/barrier layer 138. As would be evident, with higher aspect vias where the depth is much greater than the via

diameter, the via entrant angle should be increased.” [underlining for clarity]

Even assuming, for the sake of argument, that the Examiner is correct in all other matters, Wang does not teach or suggest the “channel collimator effect” or the narrow range with “sufficient specificity” to constitute an anticipation of claims 1-20. Further, the unexpected results of being able to provide uniform seed layer coverage down to the bottom of the via renders the claims unobvious.

With regard to the obviousness of the combination of APA and Wang, it is further argued that APA discloses a channel and a via while Wang discloses a via with funnel opening and no channel. By analogy, and without being facetious, it is submitted that the Examiner is combining a street having buildings on either side and a manhole in the street (APA) with a tapered funnel and hole in an open field (Wang) together to find obvious a street where the buildings are positioned so their shadows define the manhole (invention).

It is respectfully submitted that there is no motivation for the combination and the above combination would not be obvious to one having ordinary skill in the art.

It is still further argued that in order to make the combination suggested by the Examiner, the re-entrance profile or tapered funnel of the Wang via would have to be eliminated. As indicated in MPEP §2144.04 II. B, “the omission of an element and retention of its function is an indicia of unobviousness.” In re Edge, 359 F.2d 896, 149 USPQ 556 (CCPA 1966).

In the Applicant’s invention, the Wang re-entrance profile is eliminated but the function of improvement of step coverage in filling the via hole is retained.

Based on all of the above, claims 1-20 are patentable under 35 USC §103(a) as being unobvious based on APA in view of Wang.

(9) Conclusion and Relief Requested

The claims 1-20 are patentable over the prior art.

Serial No.: 09/579,340
Group Art Unit: 2814

Reversal of the Examiner's decision is respectfully requested.

Respectfully submitted,



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Date: August 18, 2003

Appendix A - Claims on Appeal (See the Appeal Brief filed March 3, 2003)